What is claimed is:

1. A magnetic tape comprising:

a back coating layer containing a carbon black;

a support;

a non-magnetic layer containing a non-magnetic powder and a binder, which is substantially non-magnetic; and

a magnetic layer containing a ferromagnetic powder and a binder, in this order,

wherein the magnetic tape is a magnetic tape for recording a signal with a 10 to 100 Mbit/cm^2 surface recording density; the magnetic tape has a temperature expansion coefficient in a width direction thereof of a 0.0015%/°C or less, a humidity expansion coefficient of 0.0015%/% RH or less, an offset yield strength in a longitudinal direction thereof of 10N or more, a rupture strength of 30 N or more; and the support has a center plane average roughness on a coating surface side of the magnetic layer of 1.0 nm or less, a center plane average roughness on a coating surface side of the back coating layer of 3.0 to 9.0 nm, and projections having a 273 nm or more height existing on the coating surface side of the magnetic layer of 10 pieces/100 cm^2 or less.

2. The magnetic tape according to claim 1, wherein the support comprises a polyethylene naphthalate.

3. The magnetic tape according to claim 1, wherein the support has a center plane average roughness on a coating surface side of the back coating layer of 5.0 nm or less.

4. The magnetic tape according to claim 1, wherein the support projections having a 273 nm or more height existing on the coating surface side of the magnetic layer of 5 pieces/100 cm^2 or less.

5. The magnetic tape according to claim 1, which has a width of 5 to 13 mm.

6. The magnetic tape according to claim 1, which has an entire thickness of 5 to 10 μm.

7. The magnetic tape according to claim 1, wherein the support has a Young's modulus in a lateral direction thereof of 600 kg/mm^2 (5,880 MPa).

8. The magnetic tape according to claim 1, wherein the support has a Young's modulus in a longitudinal direction thereof of 750 kg/mm^2 (7,350 MPa).

9. The magnetic tape according to claim 1, which has a Young's modulus in a lateral direction thereof of 650 kg/mm^2

(6,370 MPa).

10. The magnetic tape according to claim 1, which has a Young's modulus in a longitudinal direction thereof of 950 kg/mm^2 (9,310 MPa).

11. The magnetic tape according to claim 1, wherein the magnetic layer has a surface roughness Ra of 0.1 to 4 nm.

12. The magnetic tape according to claim 1, wherein the back coating layer has a surface roughness Ra of 0.0030 to 0.060 μm.